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The Journal of the Telephone Industry

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How good is your Geography?

THERE ARE STROMBER

ANSWERS:

1. TEXAS ..... XY in Etter, Stratford, Olton and Fremont
2. NEW JERSEY ..... XY at Hampton and Belmar
3. OKLAHOMA ..... all XY at Goodwell and Texhoma
4. MINNESOTA ..... it's XY at Dodge Center
5. FLORIDA ..... XY for Apopka, Inverness and Madison
6. PENNSYLVANIA ..... XY for Elderton, Rural Valley, Worthington, Treverton and Loyalsock
7. OHIO ..... XY systems in Aurora, Newton Falls, Twinsburg, Peninsula and Lordstown
8. NORTH CAROLINA ..... XY at Greensboro and Yadkinville
9. NEW YORK ..... 3 installations—at Barryville, Hilton and Rochester
10. SOUTH CAROLINA ..... XY serves Cheneee
11. UTAH ..... XY installed at Tremonton
12. WASHINGTON ..... 5 systems—for Goldendale, Seattle, White Salmon, Yelm and Ferndale
13. MONTANA ..... XY service at Chinook
14. OREGON ..... XY for Canby

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FLASHES AND PLUGS

BOOKS AGAINST BULLETS. A new use has been found for old telephone books, particularly the fat, Manhattan, N. Y., directories. The Reuben H. Donnelley Corp., distributors of the telephone directories, has just filled an order from a fruit importing company for 1,000 old Manhattan books to be shipped to Panama.

An executive of the fruit importing company explained that the books just fit between the studs of a pay truck and that 1,000 are enough to make a double lining (with steel plates between) around the four sides. This telephone book and steel sandwich is apparently adequate protection against the bullets of payroll bandits.

• • •

BABY, IT'S KNIGHT OUTSIDE. In Xenia, Ohio, as in many other locations of the Ohio Bell Telephone Co., there's an outdoor telephone instrument at the back door of the building for use of employes who come on duty after the building is ordinarily locked. They need only lift the instrument, announce their names to the operator who gets the signal at the board, and wait for the lock on the door to be released by means of a button which can be depressed at the switchboard.

An employe, however, named Eleanor Knight showed up for work one night—at least she wanted to—picked up the receiver and announced, "It's Knight." Nothing happened. She figured the operator had accidentally closed the key. Up she lifted the receiver again. "It's Knight outside," she said. Again the key was closed. Yet a third time she tried, "It's Knight outside. Let me in." At this point, the operator, very new to the switchboard in Xenia and unfamiliar with this familiar practice, whispered to the girl next to her, "I don't know just what to do. I think I've got a crazy woman on the line."

• • •

THE SPARKIN' THAT BURNED. Two raccoons in Woolstock, Iowa, picked a pair of high tension lines to do their sparking recently.

They scampered up a pole and began frolicking on the two lines carrying 6,600-volt alternating current from Webster City to Woolstock.

Linemen said the two 'coons, one on each wire, apparently engaged in an affectionate rubbing of noses. This closed the circuit and electrocuted them both.

• • •

WHEN HAMS GET TOGETHER. First names were out at a picnic in Pittsburgh, Pa., recently. The occasion—an outing of amateur radio enthusiasts from New York, Ohio, Pennsylvania and West Virginia.

"ML1, I'll be darned," said one "ham" in greeting. "LFM," returned the other. "Talked to you a dozen times—so that's what you look like."

That's the way it went throughout the day—radio call letters, not names. The main picnic course? Why, ham—of course.

• • •

A JOB TOO WELL DONE. City fathers of Glendale, Calif., recently looked proudly at their newly-finished $200,000 paving job on busy Brand Boulevard.

Then they discovered they had covered up 13 manholes, the only access to underground conduits serving telephone, light, gas, power and other utilities.

The manholes were located with master charts, and workmen began busily tearing up the street to uncover them.

Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY

September 3, 1949

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ABC of the Telephone

By FRANK E. LEE

ONE of the most important requirements in the maintenance of the telephone plant is that the storage batteries be kept in good condition. In the case of telephone storage batteries, a little care and maintenance goes a long way towards insuring a long period of trouble-free service. In the simplest form, operating instructions for storage batteries can be stated by four simple rules, as follows:

(1) Maintain storage batteries in a healthy state of charge. The method to use will vary with the type of service.

(2) Add satisfactory water at regular intervals.

(3) Keep the battery jar or case clean on the outside.

(4) Maintain a written record on the above items.

From the study of the above four simple rules, it is apparent that the maintenance of telephone storage batteries is a comparatively simple operation. However, the recommended maintenance procedures, simple as they are, must be carried out faithfully, or the result may be an inoperative telephone system when it is needed most. There should be nothing hit or miss on the question of battery maintenance. The battery plant must be in condition at any time to carry the connected load of the exchange. No one can foretell when an emergency will arise—the best insurance is to keep the battery plant at peak operating conditions. In this way a major power failure will not result in service interruptions.

There are a few general characteristics of telephone storage batteries which should be understood by all persons charged with the responsibility of battery maintenance. If these fundamentals are understood, battery maintenance will be carried out on a sound basis.

PART XLIII. Section 1. Storage Batteries—Operation and Maintenance. Preceding article in this series appeared in the June 25 issue, p. 13.

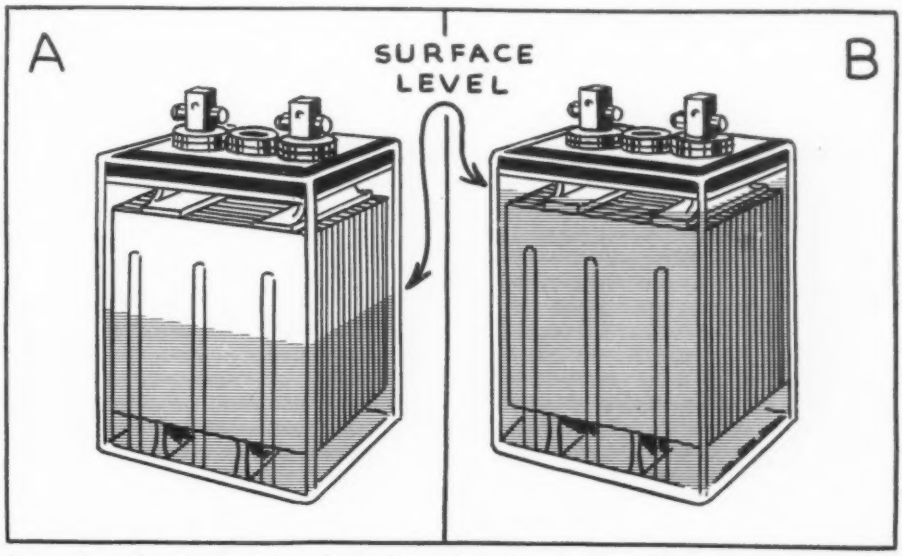
Specific Gravity

Specific gravity of a telephone storage battery is the ratio between the density of the electrolyte and the density of water which is considered as 1,000. The specific gravity of all cells in a storage battery lowers on discharge and rises again on charge. Based on this fact, the specific gravity readings of a cell can be used either during or after a discharge to indicate the proportion of rated ampere-hours discharged. As a result, if the specific gravity (or hydrometer) reading is known, the fact can be determined if the battery is fully charged, or the amount it is discharged. With all cells connected as one series, the gravity reading of one cell, known as a "pilot cell," will indicate the state of discharge or charge of the whole battery. Use of the pilot cell idea will prove advantageous when a rapid check of the battery is required during emergency operation.

Also, pilot cell tests provide a simple means of maintaining a continuous record of battery condition between the less frequent individual cell checks when the specific gravity of each cell is taken and recorded.

The specific gravity is determined by allowing a hydrometer to float in the electrolyte. When the specific gravity is high, the hydrometer will not sink as far into the electrolyte as when the specific gravity is low. To take a specific gravity reading follow this procedure:

(1) Put on a pair of cup type goggles to protect the eyes and a pair of rubber gloves to protect the hands



Change in surface level of electrolyte will affect specific gravity of storage battery. (A) Low level—high specific gravity. (B) High level—low specific gravity.

should the electrolyte accidentally splash during the tests.

(2) Insert the nozzle of a hydrometer syringe into the cell.

(3) Squeeze the bulb, then slowly release it and draw up just enough electrolyte from the cell to float the hydrometer freely.

(4) Hold the syringe in a vertical position and observe the reading on the stem of the hydrometer at the surface of the liquid. This is the specific gravity reading of the electrolyte.

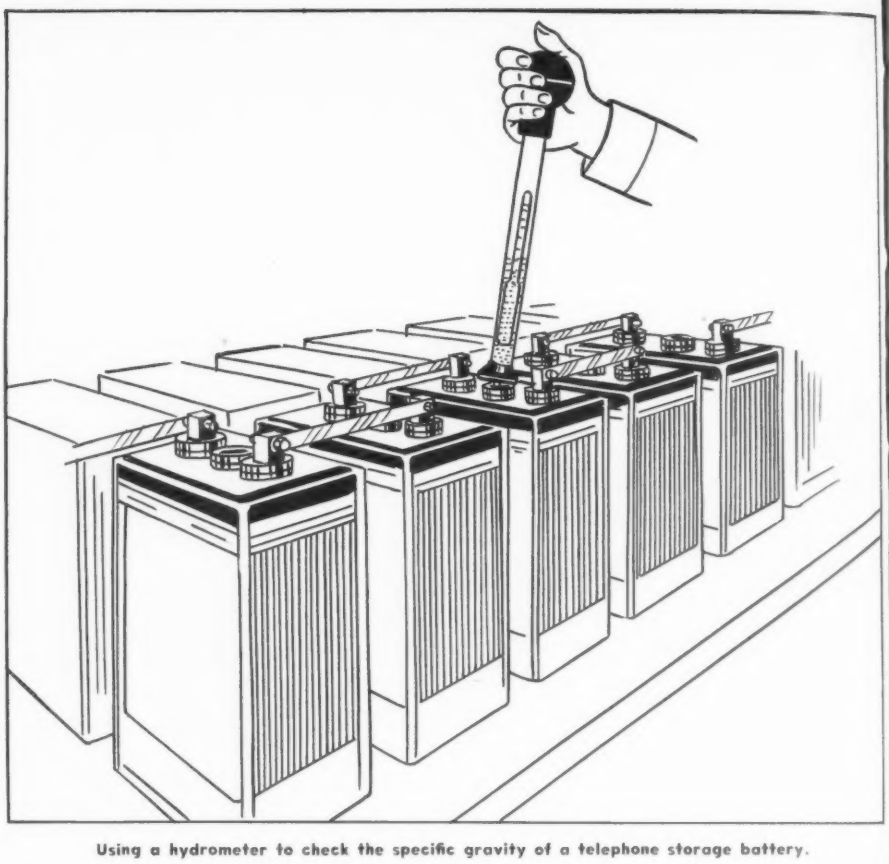
(5) After testing, be sure to return the electrolyte to the cell from which it was taken.

Effect of Change in Temperature On Specific Gravity

The specific gravity of a battery cell will vary with changes in temperature of the electrolyte. As a general rule, the specific gravity will drop one point (0.001) for each three degrees increase in temperature, and will rise one point for each three degrees decrease in temperature. For this reason, specific gravity readings should be computed on a common temperature basis in order that readings taken at different temperatures may be compared on an equivalent basis. The usual practice is to adopt a common reference temperature and record specific gravity readings as they would be if the cells were at that reference temperature. At the present time 77° F. is almost universally accepted as the standard reference temperature for specific gravity readings. The direction in which the correction factor should be applied is readily apparent when it is remembered that cold electrolyte will expand when heated. As the electrolyte expands, the specific gravity reading will be lower. Thus, if the temperature of the cell is below the reference temperature, a minus correction is required. When readings are taken at temperatures above the reference temperature, a plus correction is required.

Change in Level of Electrolyte Will Affect Specific Gravity

Another variable factor that will affect specific gravity readings is the level of the electrolyte in the cell. This change in surface level will be caused by evaporation and electrolysis losses of the water during normal charging and discharging. This factor should be taken into consideration when making a comparison of specific gravity readings which are taken at noticeably different surface levels. If the surface level is lower than normal, the specific gravity reading for the cell will be higher. Sulphuric acid is not affected by evaporation or electrolysis, and any small acid loss caused by electrolyte bubbling or spraying from the vents may be disregarded.

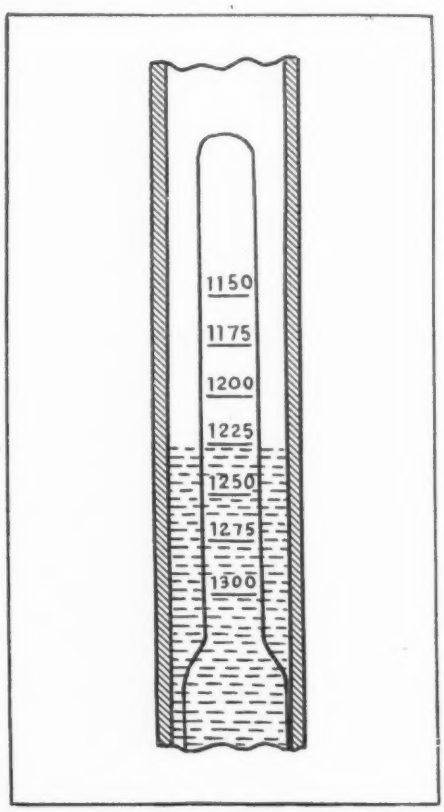


Using a hydrometer to check the specific gravity of a telephone storage battery.

Thus, in restoring cells to proper level, water only should be added.

Inasmuch as both temperature and surface level of the electrolyte affect the specific gravity reading to some extent, the specific gravity reading should contain this information:

(1) Specific gravity reading.
(2) Temperature of electrolyte.
(3) Surface level of electrolyte.



Enlarged section showing graduations on hydrometer scale.

A gravity reading should not be taken immediately after adding water, otherwise the reading will be false. The battery manufacturers suggest that a day or so be allowed for the water to mix with the electrolyte. Normal gassing or bubbling of the electrolyte, resulting from charging or floating the battery, will create all the mixing action required.

When the pilot cell method of gravity readings is used, a different cell should be used as a pilot cell after every 50 readings. This change of pilot cells is suggested to avoid lowering the cell's gravity, because of the possible loss of a small amount of electrolyte each time the gravity is read. A permanently installed hydrometer syringe which may be mounted through the vent plug of the pilot cell is available. No dripping is experienced with this type of syringe, and changing of the pilot cell is not required.

Specific Gravity at Full Charge

The specific gravity at full charge, sometimes referred to as nominal specific gravity, is an assumed value which the cell will approximate when new, fully charged, and with the elec-

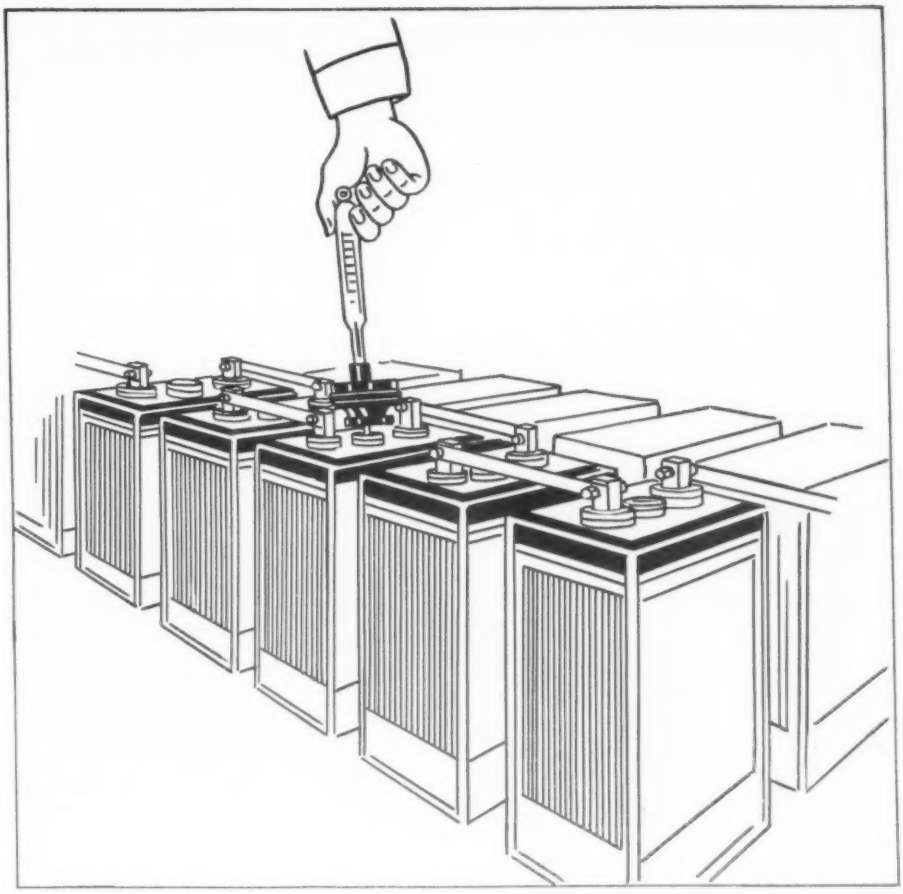
trolyte near the maximum level. Under these conditions the specific gravity at full charge usually should be as follows:

Temperature of Electrolyte	*Specific Gravity*
107° F.	1.190 to 1.210
77° F.	1.200 to 1.220
47° F.	1.210 to 1.230

As a general rule, the specific gravity of most telephone storage batteries is adjusted to these limits during the manufacturing process. Further adjustment should not be required during the life of the battery unless electrolyte actually is lost from the cells. In the event electrolyte is lost, replacement should be made with electrolyte of about the same specific gravity as in adjacent cells.

As mentioned previously, the electrolyte level falls slowly during use because the water, and water only, is subjected to evaporation or electrolysis action. When water loss occurs, the specific gravity will increase a few points. As an example, if the water level drops about one-half inch below normal, the specific gravity reading will increase approximately 15 points (0.015). Addition of satisfactory water will restore the specific gravity to its normal or previous value.

(Please turn to page 26)



Correct battery temperature is important for efficient operation. If desired, a thermometer of this type can be installed in the filler opening of a pilot cell.

VOLUME II OF "ABC OF THE TELEPHONE" READY SEPTEMBER 17

Volume II of "ABC of the Telephone" is an 80-page booklet containing reprints of Installments 22 through 41 of the popular series by Frank E. Lee, appearing currently in TELEPHONY.

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LABOR'S STAKE IN *Telephone Rate Cases*

By **FRANCIS X. WELCH**
TELEPHONY'S WASHINGTON EDITOR

A challenging interview with two responsible labor union officials produces some thought-provoking answers to the question of the telephone worker's relation to his company's rate case.

MANAGEMENT, employes, labor union officials, and, no doubt, some section of the public have been puzzled recently by certain confusing developments over the position of organized labor with respect to the current movement in the telephone industry to obtain adequate rates. This writer frankly admits his share of confusion. Because of this he was moved to seek an explanation from labor officials.

The basic question of where a telephone company worker stands, or ought to stand, on his company's rate case application—or whether he ought to take any stand at all—is fairly new. Indeed, until the postwar period confronted telephone companies of the United States with rapidly rising operating costs there was little need for labor groups or any other outside or intervening parties to take *any* position on telephone rate cases. This was because of the simple reason that there just were not any rate increase cases of major significance. Those telephone rate cases which did materialize during the depression years generally involved rate reductions. And a good many telephone companies had no rate case or rate change of any kind for long periods — sometimes for more than two decades—before the postwar price inflation made the petitions for higher rates necessary.

Since the series of telephone rate increase applications began with the Bell System companies in the fall of 1946 the attitude of some labor unions which have organized parts of the telephone industry has not been entirely clear nor consistent. At the top national level the American Federation of Labor has not taken any noticeable part in these telephone rate cases. But the International Brotherhood of Electrical Workers (AFL), which has organized a considerable segment of telephone employes, has taken a most constructive attitude, as will be seen presently.

Doubtless the AFL still holds to the basic statement made by the great founder of that organization, Samuel Gompers, who said that "the greatest crime against labor that the company can make is to fail to make a profit."

The July issue of the AFL publication *Monthly Survey* contains the following general editorial statement by way of advice to organized employes:

"Perhaps your employers' prospects are excellent, but if his profit margins are being squeezed by price declines, your future will be more secure if you help him improve his competitive position."

Also, in that issue of the *Monthly Survey*, the AFL points out that wage increases should be based on increases in productivity and that labor should cooperate with management "to prevent waste, save expenses, cut costs, and improve production."

The attitude of the other national labor organization — the CIO—toward utility rate increases generally has been somewhat eccentric. Local consumer divisions of the CIO have frequently appeared in opposition to utility rate increases. At the present writing, to the immediate knowledge of your correspondent, the CIO is appearing in opposition to a gas rate increase sought right here in the District of Columbia by the Washington Gas Light Co. It is noteworthy that the CIO union does not represent the employes of the Washington Gas Light Co. as a bargaining agent.

Last May, before the New Jersey Department of Public Utilities there was witnessed the interesting spectacle of AFL and CIO unions appearing on opposite sides of the same rate case. At that time, Public Service Coordinated Transport was seeking an increase in transit fares and the AFL union—the Amalgamated Association of Street, Electric Railway, and Motor Coach Employes—supported the company's petition. But the CIO appeared in opposition. In this same New Jersey case, an AFL official pointed out that in Philadelphia—where the transportation company employes *were* represented by the CIO Transport Union —there was no CIO opposition to the transit company's rate increases before the Pennsylvania Public Service Commission. Earlier than that, in New York City, the CIO Transport Workers Union actively supported the controversial and finally successful fight of Mayor O'Dwyer to raise the city subway fare from a nickel to a dime.

In the field of telephone rate cases, the position of the Communications Workers of America, which recently affiliated with the CIO, has been rather erratic. There has been actual opposition to rate increase petitions in some cases. More recently, before the Washington Department of Public Utilities, the Communications Workers of America have taken a somewhat more understandable position of no opposition to the rate increase, provided wage increase programs proposed by the company were first put into effect.

All this is by way of explaining the statement earlier made that the attitude of organized labor in recent telephone rate cases has been puzzling. It was at this point, in his investigation of this subject, that your correspondent learned that a petition for "leave to intervene," on behalf of a telephone company rate increase application, had been filed by four local unions of the AFL International Brotherhood of Electrical Workers before the Michigan Public Service Commission. These petitions had been filed

in the case of Union Telephone Co. by IBEW local No. 818. Similar applications were filed on behalf of Tri-County Telephone Co. by IBEW local No. 1172 of South Haven, Mich., No. 784 of Adrian, Mich., and local No. 1190 of Alpena, Mich.

These petitions (all similar in language) make interesting reading to any one concerned with the economic welfare of the telephone industry. The unions point out that they represent the plant or traffic employes of these companies and that they have, in effect, contracts covering wages and other working conditions of the telephone company employes. Then, the petition goes on to say:

"Intervenor (the IBEW union) further shows that it believes that applicant (telephone company) is presently operating and furnishing telephone service under schedules of rates, tolls, and charges heretofore ordered and approved by Michigan Public Service Commission and/or its predecessors which have become and will continue to be unjustly and unreasonably low, and that they have become and will continue to be confiscatory and in violation of Article II, Section 16 of the Constitution of the State of Michigan.

"Intervenor is an interested party in this cause by reason of the fact that all of said plant and traffic employes of said Local No. 818 are employes of applicant under contractual relationship with applicant with respect to their wages, salaries, and other conditions of employment, and intervenor believes it will be in the best interest of the employes who are members of said local that applicant be granted rates by Michigan Public Service Commission which will insure the financial stability and integrity of said applicant and at the same time enable it to furnish the best possible telephone service to its subscribers generally, and likewise deal fairly with its plant and traffic employes in all matters concerning their wages, salaries, and other conditions of employment."

Your correspondent has more recently been advised that in Illinois seven locals have filed similar intervening petitions with the Illinois Commerce Commission, where the Illinois Bell Telephone Co. is seeking rate increases.

After reading these documents, we sought an interview with two IBEW officials in the midwest. They are M. J. Boyle, Chicago, vice president of the IBEW, and one of his top lieutenants, F. M. Harris, International representative of IBEW in Michigan, with headquarters in Detroit. (Boyle's territory, incidentally, covers the five-state area of Michigan, Indiana, Illinois, Wisconsin and Minnesota.)

We wanted to ascertain whether there was a consistent basic philosophy behind the constructive attitudes shown in these petitions of intervention.

"Yes," said Boyle, "that is true. Intervening in utility rate cases—as we did recently before the Illinois Commerce Commission in support of the rate increase petitioned for by the Illinois Bell Telephone Co.—is not a new policy with local unions of the International Brotherhood of Electrical Workers. We have so acted for many years in rate changes, franchise renewals, etc., involving utility companies in instances where we felt the circumstances justified our doing so. We take the position that where our members are employed under satisfactory contractural labor conditions, we have a definite responsibility to do everything we can, morally and legally, to protect the equity of our members' jobs, consistent with the public's interest generally.

"A utility company — telephone or otherwise — operating uncomfortably close as far as earnings are concerned, or whose operations produce earnings so meager as to impair the borrowing credit of the company—is a poor risk for the continuity of employment of our members and good telephone service to the public which it serves. Company opposition to our support cannot erase or lessen our obligation to insure our own members' job security, so we file to support whether the company likes it or not."

Boyle summed up his union's attitude in such rate cases with the following crisp comment:

"Our union members can't make a decent livelihood working for unprofitable or bankrupt telephone companies, nor should the public expect good telephone service from such companies."

Harris elaborated on that statement by pointing out that, "Where our attention is called to the fact that telephone companies employing members of the IBEW initiate petitions for rate increases, and our investigation shows they are actually in need of additional revenues, we feel it proper that our local unions should intervene to protect their members' job security."

Harris made a practical observation at this point on the value of labor union intervention in telephone rate cases. "We know," he said, "that public service commissions are often under pressure to keep utility rates down to the lowest possible level. This is especially true of the telephone industry which has always been fair-game and a primary target in any movement to nationalize utilities. No rate increase is ever going to be popular with the commissions or the public, even though its need is generally recognized. But when telephone management, alone, tries to fight these cases, I don't think I am stating the case too bluntly if I say that political expediency can become a severe temptation to the state regulatory bodies. However, when labor unions, composed of employes of such companies, having ascertained to their satisfaction the need for a rate increase, actually intervene to support such petitions, the result is that more serious attention is given to the petition by the state public service commission.

"In the final analysis," concluded Harris, "who are the parties most concerned in utility rate cases? First, there is the public, of course, which is entitled to good service, and for which it should pay a fair and reasonable rate. Secondly, there are the stockholders represented by management, which, among other things, is charged with the responsibility of seeing to it that the enterprise continues to attract capital to finance properly the needs of an expanding telephone service. Only when a business is financially healthy can it offer well-paying jobs with a promise of more and better job opportunities in the future. Finally, there are the employes who are unquestionably entitled to fair wages and working conditions, including job security."

"I have contended for years," chimed in Boyle, "that any business which, through its own sins of omission or commission, finds itself unable to pay decent wages to its employes has, in a large measure, forfeited its right to stay in business. In the case of a telephone company, the public is not entitled to get service at a rate so low that it has to be subsidized at the expense of the telephone employes' labor or of the telephone company's stockholders. Yet that is exactly what has been happening in the case of many telephone companies. Some of their rates haven't been changed for nearly a quarter of a century. What has been happening is a systematic subsidizing of public service whereby the telephone employes have, in part, been giving away their services because of inadequate wages. And the telephone companies, too, have been systematically giving away part of their plant facilities through failure to realize adequate earnings. That situation is not only unfair, it is unhealthy. It cannot continue without causing injury to the industry, its employes and to the public which it serves."

Boyle's pencil made some figures on a piece of paper. He continued his analysis of telephone rate economics, rather unusual, to be sure, coming across the desk of one of the nation's best known labor leaders. "The ironi-

(Please turn to page 29)

THE PLANT MAN'S *note book*

BY RAY BLAIN TECHNICAL EDITOR

SMALL five and 10-pair plastic insulated and jacketed cables are now available and may be used to advantage in wiring telephones in office buildings. We understand that the use of these small cables proves more economical than placing ring runs of several pairs of wires. They certainly make a much neater and serviceable job.

• • •

It has been said: "Opportunity doesn't knock these days, it calls on the telephone and asks a silly question."

• • •

It is always pleasing to the writer to note that the camera is rapidly becoming a useful tool in the management of the average telephone exchange. Picture records of plant always prove valuable. "Before" and "after" photographs also provide an accurate record of accomplishment. Then, too, a picture of a line to be repaired serves as a good reminder, and all of the details to be corrected will be accurately recorded in a good photograph.

A traffic engineer informed us recently that he always keeps photographs of the face equipment of all manual toll boards in his particular area. He states further that these pictures prove more useful than the average face equipment drawing.

• • •

Quartz crystals are used extensively in electronics to stabilize frequencies. Without them, radio and television stations would have trouble in always transmitting on their assigned frequencies. Huge quantities of crystals also are used in military communications equipment.

Crystals, however, deteriorate and those used in precision radio sets in the past have deteriorated in large numbers, thus permitting the signal to slide or "drift" away from the desired frequency as time passes.

By means of a new process, discovered by scientists of the Frequency Control Branch of the Signal Corps Engineering Laboratories at Ft. Monmouth, N. J., the aging characteristics of quartz crystals are virtually eliminated. This new process involves superheating of the crystals to approximately 900 degrees F., followed by slow cooling.

• • •

Telephone users often develop an almost bellicose attitude when they call a large firm and are transferred from one telephone to another in a vain search for the required information. For example, a customer may call the accounting department about a bill, only to be transferred to the cashier's office, and then on to the adjustment office, etc. This "buck passing" may continue for a considerable length of time until the customer hangs up in disgust without ever having obtained the desired information.

The Washington (D.C.) Gas Light Co. back in 1940 learned that it was receiving about 2,000 calls of this nature each day and that many of them were not being handled in a satisfactory manner. So it decided to do something about it. After many months of consultation with the Chesapeake & Potomac Telephone Co., a type of service was adopted which has proved ideally suited to the situation.

Under this system, all telephone calls are routed directly to the Gas Company's Telephone Service Bureau. The customer talks with only one employe—a man who has had actual field experience and is versed in the various types of problems confronting customers. Regardless of the nature of the business, the employe answering the call is able to handle everything without transferring the customer from one department to another. If necessary, a three-way conference call can be set up between the customer, the bureau employe and a representative of any particular department.

The majority of calls received relate to service of equipment or information concerning accounts. People frequently call to request information as to how gas furnaces or refrigerators may be started.

When the bureau opened, its board had 14 positions and handled 336,000 calls the first year. Now it has increased to 30 positions and handles about 645,350 calls annually.

It is quite possible that many operating companies have customers who could make use of a similar service to advantage.

• • •

The efficiency of the modern chemical type dehumidifier is astonishing. These simple devices consist principally of a chamber to hold a quantity of calcium chloride, a circulating fan and a vessel to retain the moisture extracted from the air.

One type on test in a room which registered 75 degrees temperature, with a relative humidity of 85 per cent, gave the following performance: Within two hours the humidity was reduced to 71 per cent. Then, within ten hours, the humidity was further reduced to 66 per cent. A total of 9.6 quarts of water was removed from the air in a period of 24 hours.

These units prove ideal for use in damp, humid telephone equipment rooms or basements.

• • •

We note, with much gratification, that the majority of the new light installation trucks are equipped with overhead ladder racks. This type of rack is certainly much neater and is much less a traffic hazard than the side-mounted rack variety. Also, the overhead type will accommodate long extension ladders and tools such as tree trimmer and pike poles which may be carried with ease and safety.

• • •

Frequently, these days, we hear someone lament the passing of the friendly operator in the small exchange when manual gives way to dial operation. These small communities often

relied on the operator for many personal services. She kept track of doctors and made certain that they received emergency calls promptly. She even called mothers when the baby cried, if the receiver was left off the hook near the infant's crib. If a husband called home and received no answer, the operator would usually cut in and advise him that she was visiting Mrs. Smith and could be reached by calling that number.

Now, however, when the small manual switchboard and the accommodating operator is replaced by an efficient unattended dial exchange, this personal touch is lost and is sorely missed even though the telephone service, in general, is considerably improved thereby.

This, undoubtedly, is the price we are forced to pay for progress, for not even the most accommodating operator could long continue giving the personal service she gave in the old days when one considers the average rapidly expanding community of today which requires up-to-date telephone service.

PLANT MAN'S QUIZ

Q. How can we provide a howler for use in signalling subscribers who leave their receivers off the hook?

A. It is recommended that you procure a howler which has been especially designed to provide this service from one of the telephone supply houses. These howlers can be powered by a booster coil combined with an adjustable interrupter to change direct current to a high frequency pulsating direct current.

• • •

Q. When both land and water routes are available between two points, which is preferred, submarine or underground cable?

A. This will depend entirely upon local conditions. If the nature of the water route is such that a submarine cable will not be disturbed, then a submarine cable might prove more economical over a term of years. On the other hand, if the submarine cable must be installed near a ship's anchorage, its maintenance might prove extremely expensive.

The repair of one case of trouble on a submarine cable could cost as much as several years' maintenance on an underground.

In general, underground cable is to be preferred to submarine in practically all locations where it can be used. This will prove true even though the underground installation's first cost is considerably in excess of the submarine.

• • •

Q. Will it be possible to install alpeth cable by the use of an ordinary type cable plow?

As a rule, buried cable, when installed in the ground without conduit, whether in a trench or by the plow method, should be protected by steel tape armor.

A. It is our understanding that alpeth cable was not designed with a view to its being installed without conduit. This cable has, however, been quite extensively used in underground conduit.

Labor costs may be reduced materially on a big job by the use of good sectional steel forms.

• • •

Q. What type of forms are recommended for use in the construction of standard concrete telephone manholes?

A. This will depend to a great extent upon the number of manholes being constructed. If only a small number are to be constructed, forms can be built from plywood reinforced by two by four inch timbers. On the other hand, if a considerable number of manholes are to be constructed, then the purchase of sectional steel manhole forms will be justified.

• • •

Q. When lead covered paper insulated cable installed in a dry building is spliced, can it be properly protected by a tape covering to prevent wiping a lead sleeve?

A. This practice has been used to some extent by covering splices with reverse layers of tape and asphaltum varnish. It is believed, however, that a lead sleeve is more desirable when it can be provided.

• • •

Q. What type of marker is recommended for use along a buried cable route?

A. We are advised by a large operating company that it has found a length of pipe about three to five feet long, set in the ground a suitable depth, proves the most desirable for this purpose. This pipe may be painted any color desired and the required information stamped on it.

It has been found that this type of marker is not subjected to the vandalism that usually happens to a concrete marker with a metal insert on which the required data has been stamped.

• • •

Q. Why has the use of rolling ladders been discontinued in central office equipment rooms?

A. The rolling ladders which are attached to an overhead rack are still extensively used in large telephone exchanges.

In some medium and small sized exchanges, the use of rolling ladders has been discontinued as an economic measure. In these cases, it has been determined that good portable ladders adequately meet all requirements.

• • •

Q. Is it possible for conduit of any type to cause corrosion trouble on underground lead covered telephone cable?

A. There have been a few cases reported where fir and pine conduit made of creosoted green wood have caused some corrosion trouble. This was, however, several years in the past and apparently present methods of manufacture have eliminated the possibility of trouble of this nature.

Several cases are also on record where conduit made of concrete has caused corrosion trouble. In such cases, it was decided that the free lime in the concrete caused the corrosion.

There is absolutely no danger of vitrified clay, cement-asbestos or fibre conduit causing even the slightest corrosion trouble. Occasionally, conduit is blamed for corrosion of lead covered cable when chemicals in the soil have drained into the conduit and caused the trouble.

• • •

Q. Will colored telephones fade if installed in a location where the sun shines on them for a considerable time each day?

A. We do not have any factual information on this subject as colored telephones have never been used in large numbers. It is doubtful, however, that they will fade since the cases are moulded from colored bakelite.

We personally have a red telephone which is nearly 20 years old and this has not faded in the slightest.

THE LEICH TELEPHONE

& TRANSMISSION &

SPECIFICATIONS

Leich Common Battery Telephone

RINGER	Leich Code 32. Two-toned gongs, easy adjustment, permanent cobalt steel magnet.
TRANSMITTER	Western Electric Code F-1.
RECEIVER	Western Electric Code HA-1.
INDUCTION COIL	Leich Code 27. Maximum talking efficiency on both long and short lines.
CONDENSER	Leich Code 58-A. Assures longer life, hermetically sealed against moisture.
HOOKSWITCH	Leich Code 4-A. Carefully engineered and tested for positive operation whether telephone is used for wall or desk model.
TERMINAL PANEL	Leich Code 011899. All terminals securely clinched in position to eliminate turning and shorting.
CASE	Leich Code 011900. Bakelite. Good impact strength and lasting beauty.

Leich MANUFACTURERS OF TELEPHONES, SWITCHBOARDS AND RELATED APPARATUS SINCE

...ECEPTION...

the finest you've ever experienced

Here is the "talkingest" telephone you have ever used. Here, in this new Leich telephone, are transmission and reception the likes of which have never before been available in a telephone instrument.

The capsule type transmitters and receivers are recognized as the best available to the telephone industry.

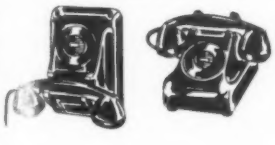
Veteran telephone men — real old timers — tell us they were positively amazed at the improvement in transmission and reception when they installed these Leich telephones.

May we suggest that there is one best way to test transmission and reception. And that is...to install just one of these Leich telephones on your line and compare it critically with whatever telephone you have been using.

And, Mister Telephone Man...if you are not positive that this is the clearest, highest fidelity transmission and reception you have ever experienced ...just tell us so and we will return the purchase price to you.

We mean it. Leich Sales Corporation, 427 West Randolph Street, Chicago 6, Illinois.

AND DON'T FORGET



This Leich common battery telephone can be used as a desk or wall model. There's nothing to change, add or buy. Just hang it on the wall or set it on a table. This feature makes your Leich telephone more convenient and practical.

THE OPERATOR'S Corner

BY
MAYME WORKMAN
TRAFFIC
EDITOR

TROUBLE caps are familiar equipment to operators working at a switchboard. When a cord or plug becomes defective, a trouble cap is placed on the plug until it is repaired. This precaution is taken to avoid using the cord in establishing a customer's connection. Failure to use trouble caps usually results in service complaints.

An interesting article entitled "Trouble Caps" appeared in the June issue of *Tele-News*, published by the Indiana Associated Telephone Co. The article was written by Bess Britton, division warehouse clerk, Lafayette, Ind. Miss Britton stated:

"An old proverb says, 'Never borrow trouble,' and we carefully heed that warning at the Division Warehouse. We never borrow trouble. No! We go one step further and actually BUY it! We order trouble caps by the dozen, which is better than borrowing trouble caps or borrowing trouble, for that matter.

"If we borrow trouble caps, the owner might want them back before we were through with them, whereas if we buy them, we can always blame the seller if they turn out to cause us the wrong kind of trouble or if we haven't enough trouble, or if we can't find the right kind or can't get into trouble soon enough or can't cause it for the right people.

"I asked Mr. Smith what trouble caps were, but he only said for me to put on my thinking cap, which is the same thing as a trouble cap, as far as I am concerned, for as soon as I start thinking, I always get into trouble. So I go on being troubled over the troubles caused by trouble caps.

"I wonder who gets to wear them? Do only the people who are already in trouble with someone like the boss wear them? Or is it the people who want to make trouble for someone like the boss wear them? How do they know what size to order? Do they go by the size of the trouble they cause or by the size of the trouble they would like to make for someone?

"How long do people have to wear them? Until they wear out, or the wearer wears out, or the trouble wears out, or the boss wears out? Which reminds me of the boss, so I'll ask him what trouble caps are. He says they are used for plug trouble.

"Now down on the farm, where I come from, we always did have trouble with our 'plugs,' but we never thought of putting a cap on them for it. Sometimes we used to wonder if maybe a cap wouldn't be a good thing to keep the flies away from their ears and the sun out of their eyes, but we always had to wear our straw bonnets until they were too worn out for even a 'plug' to wear, and we never did have any extra caps lying around for them to use. Anyway, the 'plugs' gave us enough trouble without putting a trouble cap on them to remind them of it.

"The catalog down here says trouble caps are little 'fibre tubes, one inch long, used as temporary markers for cord circuits in which there is trouble.' But shucks, now that I know what they are, it isn't nearly as much fun to type the Requisitions ordering them."

Operators can be helpful in avoiding trouble and can reduce the size of the order for trouble caps by handling cords and plugs in the prescribed manner. By observing the following "don'ts," the use of trouble caps will be kept at a minimum:

(a) Don't push the plug in the socket with the palm of the hand.
(b) Don't bear your weight on the plug when inserting it.
(c) Don't drop the plug on the keyshelf.
(d) Don't jerk the plug out by the cord.
(e) Don't fail to signal the adjacent operator to take the plug out on long reaches.
(f) Don't fail to report a plug or cord as soon as you find it is defective.
(g) Don't fail to tell your supervisor or chief operator if a cord has been capped for an unreasonable length of time.

Traffic Questions

(1) What is a trouble cap?
(2) When the calling party will talk from another station, should the entry "recd (first no)" be made in the space for reports or in the "Special Instruction" space?
(3) How long should a subscriber's line be held on a permanent signal before reporting the trouble as a permanent signal?
(4) In timing a toll ticket on a calculagraph, should the lever be pushed backward and then
(5) How should a ticket be placed in the calculagraph when it is necessary to stamp it a second time?

Answers are presented on page 23.

V V

Bolenius, Miller Directors Of Bell Lab

William C. Bolenius and Bartlett T. Miller, vice presidents of the American Telephone & Telegraph Co., have been elected to the board of directors of Bell Telephone Laboratories.

They fill vacancies created by the resignations of O. B. Blackwell and K. S. McHugh. Mr. Blackwell, an assistant vice president of AT&T, will retire shortly, and Mr. McHugh, until recently a vice president of AT&T, is now president of the New York Telephone Co.

V V

Monthly Fire Losses in July Drop to New Low for Year

Estimated monthly fire losses dropped to a new low for the year during July, totalling $49,592,000, or 4.2 per cent less than the June total, according to the National Board of Fire Underwriters.

Last month's total represented a 2.7 per cent decrease from the estimated losses in July, 1948. This was the seventh month during which losses were lower than those of the same months a year ago.

Total losses for the first seven months this year reached $398,399,000, which is $39,036,000, or 8.9 per cent less than losses for the same period in 1948.

For the year ending July 31, 1949, losses amounted to an estimated $672,078,000. This is a decline of 5.5 per cent from losses of $711,437,000 for the year ending July 31, 1948.

telephony's *SAFETY* bulletins

No. 15—Wear your goggles. They should be worn on any job where particles of dirt or metal may fall into the face or be driven through the air.

by FRANK E. LEE

"TWO packages of cigarettes, please."
"Thank you."

That's the way a man buys two days' supply of smoking pleasure. Cigarettes are easy to replace.

"Ten gallons of gas, two quarts of oil, and check the radiator." That sounds like a telephone man on a vacation trip. Yes, the old bus must use a little oil on a long, steady drive, and it is easy to replace.

Yes, two packages of cigarettes are easy to replace—so are two quarts of oil—how about two eyes?

Have you ever seen a telephone man carefully place his cigarettes in an elaborate case to protect them from crushing, then drill a hole in a brick wall while his goggles remain in his tool kit, leaving his eyes unprotected? It doesn't sound logical, yet it happens every day—sometimes with serious consequences.

Then there is the case of the telephone man trimming a tree. He carefully ties the heavy branches with rope so they won't fall and break the subscriber's ornamental fence. But while he trims, his goggles are in the truck parked in front of the house. Goggles left in a tool kit are worthless for any purpose. Worn on hazardous jobs, they are sight savers—insurance that your eyes will last a lifetime.

Instruction in the use of goggles can be greatly improved. Where an eye hazard exists, instructions should be "For this job we must wear our goggles, and use the following tools. . . ." Place the use of goggles first in thinking and teaching. Talk safety first, then talk about the job. That's one excellent way to emphasize safety and the use of proper protection on jobs where an eye hazard exists.

A typical list of telephone work operations where goggles should be worn is as follows:

(1) Cleaning equipment with an air gun.
(2) Checking storage batteries.
(3) Overhead work.
(4) Handling hot lead.
(5) Scraping old paint.
(6) Cleaning cable terminals.
(7) Driving attachments in poles.
(8) Removing wire or cable from poles.
(9) Removing inside wire.
(10) Drilling holes in brick or concrete.
(11) Handling or trimming branches and brush.
(12) Chipping cable armor.

Goggles should be worn on any job where particles of dirt or metal may fall into the face or be driven through the air.

Actually, there can be no mincing of words when it comes to protecting the eyes on the telephone job. Goggles were developed because eyes cannot be replaced. When the job is the least bit hazardous, take the goggles out of the tool bag. Put them on the eyes where they belong.

Remember—a sightless lifetime is a long, long time. YOU HAVE TIME FOR SAFETY.

• • •

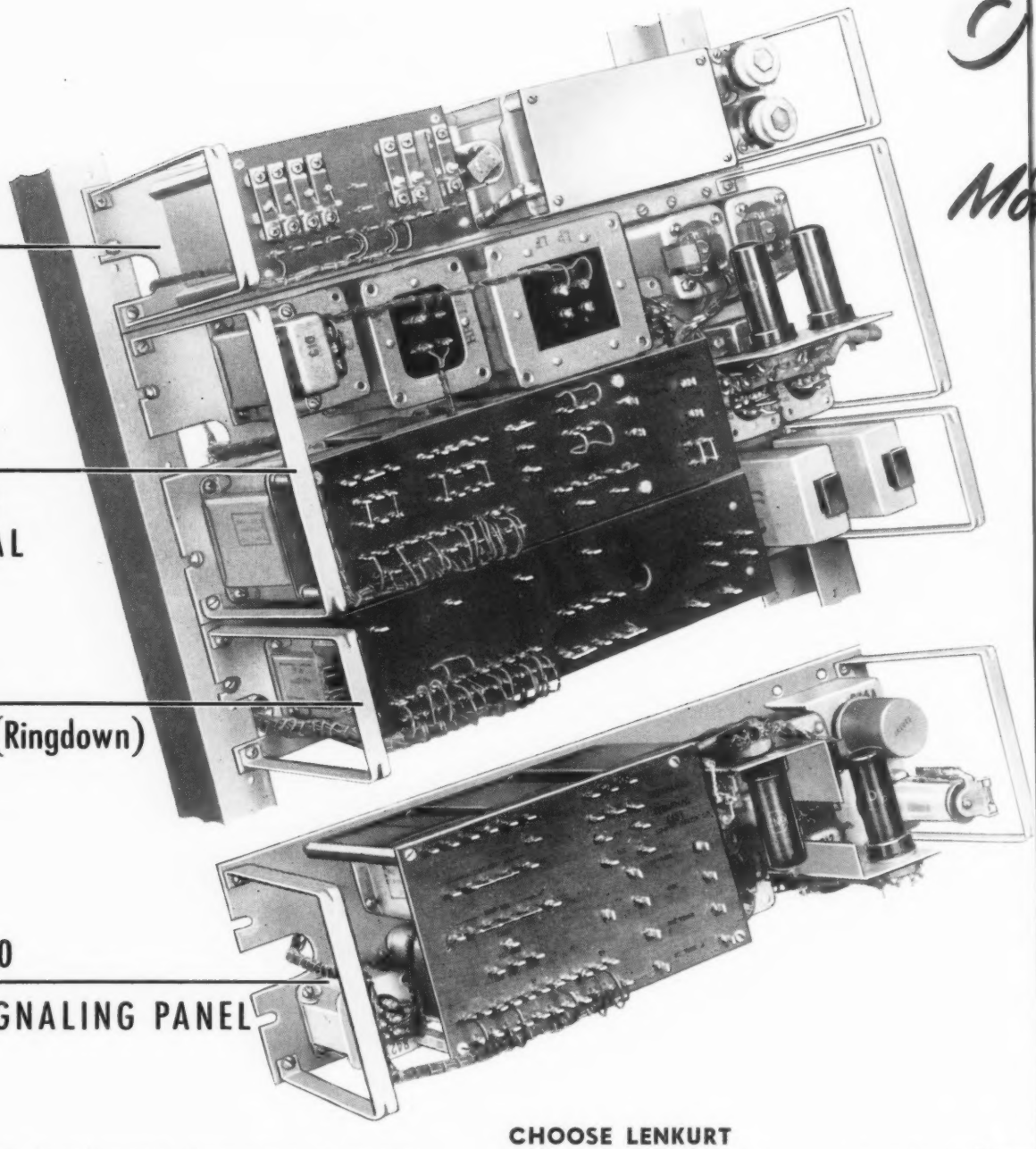
Many politicians are in the habit of laying it down as a self-evident proposition that no people ought to be free till they are fit to use their freedom. The maxim is worthy of the fool in the old story who resolved not to go into the water till he had learned to swim.

—*Macaulay.*

• • •

"The workers will become slaves if the Socialist idea is carried out to its last consequence. Socialism leads to the Stakhanov (step-up of work) system, to the proletarianization of everybody, and to an ignominious dependence on the Moloch state of all workers, employes, and employers—if the latter can carry on at all."—*Joseph Cardinal Frings, Archbishop of Cologne, Germany.*

Better than Ever!



Compactly rack-mounted, shown above with Alumilite dust covers removed, the Type 10G System comes equipped with the Type G ringer (carrier frequency ringdown) panel. The Type 10F System comes equipped with F10 signaling (carrier frequency dialing) panel. These two panels are interchangeable.

CHOOSE LENKURT
If you require channels to an automatic exchange, expect to convert to dialing in the near future.

CHOOSE LENKURT
For low cost service if you expect to continue man operation.

CHOOSE LENKURT
To provide "individual line" service (magneto or C to an important subscriber or paystation in your r area.

Lenkurt

Type 10

Carrier Telephone Systems

Versatile !! – Long Lived – Dependable

Lenkurt Type 10 Carrier Telephone Systems are now available for immediate delivery. Fill that need for an additional dependable "short-haul" carrier channel now at lowest cost. The new Lenkurt Type 10 is *better than ever.* Here's why:

NEW "LONG-LIFE" TUBES

New "long-life" tubes have materially increased circuit stability and given an added boost to the over-all performance by reducing interaction between the terminal and the ringer circuits, and raising the transmitting level of the ringer to plus 15 dbm. Tube replacement has been reduced to an absolute minimum.

BIAS-TYPE FEEDBACK

Bias-type feedback has been added to the Type 10 System oscillators, thus considerably extending their operating margin. The load carrying capacity of the transmitting and receiving sections has also been improved due to reduction of distortion in the oscillator circuit.

TOROIDAL COILS

Lenkurt Carrier equipment utilizes toroidal coils in the line filters for optimum performance.

Hundreds of Type 10 Systems are daily proving their worth throughout the world, so for your "short-haul" single-channel carrier applications choose the best—choose Lenkurt Type 10 Carrier Telephone Systems.

Write for Circular 1603

RECOMMENDED AND DISTRIBUTED BY

AUTOMATIC ELECTRIC
SALES CORPORATION

1033 WEST VAN BUREN STREET • CHICAGO 7, ILLINOIS

Courts and Commissions

Pennsylvania Telephone Corp. Files Rate Increase Tariff

The Pennsylvania Telephone Corp., Erie, filed a new tariff with the Pennsylvania Public Utility Commission increasing rates by $1,231,132 a year, effective Oct. 16.

The company serves 83,455 subscribers in the cities of Erie and Johnstown and the counties of Erie, Bradford, Cambria, Crawford, Indiana, Somerset, Venango, Warren and Westmoreland.

The company said the increase is necessary to attract new capital and provide investors with a fair rate of return. The new tariff increases local and intrastate toll rates and eliminates concession rates. Decreases amounting to $3,408 are proposed for 380 customers.

V V

Nebraska Independent Gets Second Rate Increase

Authority to increase rates has been granted by the Nebraska Railway Commission to the Scotia Telephone Co. The company operates an automatic dial exchange with complete metallic service to 28 business, 99 residence and 146 rural subscribers. It received an increase in May, 1947, but the commission has found that it cannot continue to give good service without further rate relief.

Business rates are increased from $3.50 for individual service to $4.00, from $2.50 to $3.25 for joint user, and from $3.00 to $3.25 for two-party service. Individual residence rates are increased from $2.75 to $3.00 and party residence and rural from $2.25 to $2.50. The estimated increase in annual revenue is $903. Gross earnings in 1948 were $8,735, which produced a net income of $2,070.

Storm damage during the winter forced expenditures of $3,461 for six months, which exceeds an average full year of charges in this category. The company has a total fixed investment of $52,445, and a present property value of $45,375. The commission finds that although revenues will materially increase, the net income will be lower due to increased operating charges. This is estimated at $1,430, or a return of 3.15 per cent. The new rates became effective Sept. 1.

V V

D. C. Commission Adopts New "Bookie" Rules

A solution to the troublesome problem of discontinuing telephone service to subscribers suspected of making illegal use of the service has been attempted by the District of Columbia Public Utilities Commission.

The commission has ordered the Chesapeake & Potomac Telephone Co. to change its present tariffs which permit the telephone company to disconnect telephones when used for illegal purposes. These rules had previously been used by the district attorney to order the telephone company to cease serving suspected bookmakers.

The change which the commission has ordered still allows disconnection of the service, under the following conditions: (1) The company must give notice to the subscriber that his telephone may be disconnected—and why; (2) the company must also inform the subscriber that he has a right to appeal to the District of Columbia Public Utilities Commission; (3) upon the filing of a petition for such an appeal by the aggrieved subscriber, the commission will grant an immediate hearing; (4) at such hearing, the telephone company must produce its evidence of illegal use (presumably furnished by the district attorney, police, or other authorities), upon which the telephone company purports to act; (5) the disconnection will be held up until the completion of the hearing, and final ruling of the commission as to the sufficiency of the company's evidence; (6) while the commission may not compel public authorities to divulge evidence they have collected, it could prevent a disconnection of telephone service unless enough evidence of unlawful use has been developed before the commission.

USITA PLANS 4-DAY MEETING

Announcement that the coming annual convention of the United States Independent Telephone Association would be held on four days instead of the usual three was made recently by Executive Vice President Clyde S. Bailey. The meeting will be held Oct. 10, 11, 12 and 13 at Hotel Stevens, Chicago.

V V

Florida Commission Increases Bell, Toll Rates

The Southern Bell Telephone & Telegraph Co. has been given authority by the Florida Railroad & Public Utilities Commission to increase its exchange and toll rates to produce an 11 per cent increase in annual revenues.

In issuing its order, the commission also set up a new intrastate toll rate schedule for both the Bell company and all Independent companies. The new Bell schedule and toll rates went into effect Sept. 1.

V V

Rules Business Directory Contracts Fraudulent

A publisher of a business directory on July 28 was ordered to cancel and surrender advertising contracts by a Pennsylvania court which ruled that the publisher had presented contract forms which were deliberately and fraudulently prepared so as to confuse and mislead advertisers into the mistaken belief that they were signing renewals of advertisements in the telephone directory.

In *A. J. Bamberger v. Home Owners Guide Publishers, Inc.*, the Common Pleas Court, No. 4, Philadelphia County, held that the fact that the plaintiffs may have been negligent in reading or in not reading the contracts is no defense to one who is guilty of deliberate fraud. Different persons who signed contracts may join in one

proceeding in equity and obtain relief. The plaintiffs will not be unjustly enriched by cancellation of contracts since the defendants' publication is worthless to them, the court ruled.

V V

Tennessee Coops Held Liable for Taxes

The Tennessee attorney general's office recently expressed the opinion that a 1945 state law exempting electric cooperatives from ad valorem property taxation is unconstitutional. The act proposed to exempt cooperatives built after January 1, 1945, from ad valorem taxation for the first four years of their operation.

The opinion was given by Solicitor General W. F. Barry in answer to a request from Commissioner J. B. Avery, Sr. of the Tennessee Railroad & Public Utilities Commission. Mr. Barry said the commission "should disregard this unconstitutional act in assessing the properties of these general welfare cooperatives for taxation."

The opinion said electric cooperatives are not covered by a section of the state constitution which permits the legislature to exempt from taxation properties "held by the state, by counties, cities, or towns."

Leaders of Tennessee's 23 rural electric cooperatives were reported mapping a fight against the state's effort to increase cooperative property taxes by 332 per cent. The coops declared the record-breaking assessments, levied last month by the railroad and public utilities commission, threaten their financial stability, and may halt line extension.

V V

New Rates Approved

An emergency having been found to exist by the Nebraska Railway Commission, approval was given to a request by the Nebraska Continental Telephone Co. to make certain changes in rates for local service at its Woodruff and Long Island, Kan., exchanges, previously granted by the Kansas Corporation Commission, effective Aug. 1.

V V

To Issue Stock

The Gilroy (Calif.) Telephone Co. on Aug. 17 received California Public Utilities Commission authority to issue 3,667 shares capital stock at $15 a share. Proceeds will reimburse the company's treasury for earlier expenditures, and finance additional expansion of its cable and new telephone facilities.

Senate Votes 750-Station Exemption

On Aug. 30, the U. S. Senate voted to include in the Wage-Hour Law an exemption of telephone operators' wages for exchanges of less than 750 stations. If finally approved by the Senate, the bill will have to go to conference because the House allowed an exemption of only 500 stations.

Commission Approves Plant Extension Charges

The Michigan Public Service Commission recently authorized the Crystal Telephone Co. to file a plan for plant extensions requiring the company to furnish two-tenths of a mile of pole line construction to reach a new rural customer located in its exchange service area.

Extensions in excess of two-tenths of a mile are to be paid for by the customer upon the basis of the current average cost of construction as filed by the company with the commission.

V V

Fined for Use of Slugs

The first prosecution under the new Nebraska law increasing to $200 the penalty for putting slugs in telephone paystations caught Norman Livermore, a resident of Chicago. A Loup City, Neb., magistrate fined him the limit.

V V

Sets Rate Hearing Dates

Hearing dates on the rate increase applications of the Dixon Telephone Co. and the Eddyville Telephone Co. have been set for Sept. 23 and Sept. 16, respectively, by the Nebraska Railway Commission.

Answers to Questions on Page 18

(1) The answer to this question will be found in the preface.

(2) This entry is made in the space for reports.

(3) The subscriber's line should be held for five minutes.

(4) The right-hand lever should be pushed backward and then pulled forward.

(5) The ticket should be reversed so that the stamp will be opposite the first stamp.

Petitions FCC to Authorize "Phonevision" Broadcasts

The Zenith Radio Corp., Chicago, Ill., has asked the Federal Communications Commission for authority to make experimental "phonevision" broadcasts in the Chicago metropolitan area. It would offer "phonevision" as a television-subscriber service to include first-run motion pictures, current stage productions, and special events. Zenith said its experimental television station at Chicago would be used to test the plan.

The radio company proposed to distribute special receiving sets to 300 persons, most of them in the area of the Lakeview exchange of the Illinois Bell Telephone Co.

The "phonevision" broadcasts involve a dual operation; that is, tuning in on a television set, plus a telephone wire connection. Any set could pick up the "phonevision" broadcast in scrambled form. The telephone connection provides the key for unscrambling the picture on the screen.

The subscriber to the service would notify the telephone company when he wants to receive a "phonevision" program and the operator would throw a key. The service would be charged on regular monthly telephone bills. The telephone could still be used for regular conversation while such connections were on.

V V

Commission Operates Company

The Clifton Forge-Waynesboro Telephone Co., Waynesboro, Va., since Aug. 10 has been operated by the Virginia Corporation Commission to prevent interruption of service when wage discussions broke down. This action is in accordance with a provision of the state utility anti-strike law.

V V

Summary of Commission Rulings and Hearings

California Public Utilities Commission

Aug. 15: Pacific Telephone & Telegraph Co. authorized to purchase the Guglielmetti Telephone Co.

Kansas Corporation Commission

Sept. 19: Hearing on application of Western Light & Telephone Co., Inc., Kansas City, Kan., for authority to change rates.

Sept. 23: Hearing on application of Olsburg (Kan.) Telephone Co. for authority to change rates.

Sept. 23: Hearing on application of Utica (Kan.) Telephone Co. for authority to change rates.

Oct. 31: Continued hearing on application of Southwestern Bell Telephone Co. for authority to change rates.

Study Shows High Cost Of Rural Metallic Service

An interesting analysis of the cost of rendering rural metallic telephone service was given by H. B. Couch, secretary of the Kansas Telephone Association, in a recent issue of the association's bulletin. Mr. Couch's study was based on a company serving 213 stations, and showed that the cost of rendering metallic service would be $5.14 per station.

The information used by Mr. Couch was presented in an application for increased rates filed with the Kansas Corporation Commission. Following is his analysis:

Poles and wires	$48,918.82	
Telephones and wiring	8,411.37	
Total	$57,330.19	
Investment per station (213)	$ 269.15	
	Annual Cost Per Station	*Monthly Cost Per Station*
Interest to investor, 6%	$16.15	
Depreciation to protect investor, 4%	10.77	
Total for Investor	26.92	$2.23
Traffic expense (operators)	12.70	
Maintenance of plant	13.30	
General office expense	5.25	
Taxes	3.68	
	34.93	2.91
Grand total	$61.85	$5.14

V V

Honor R. L. Mehaffey For 45 Years of Service to Company

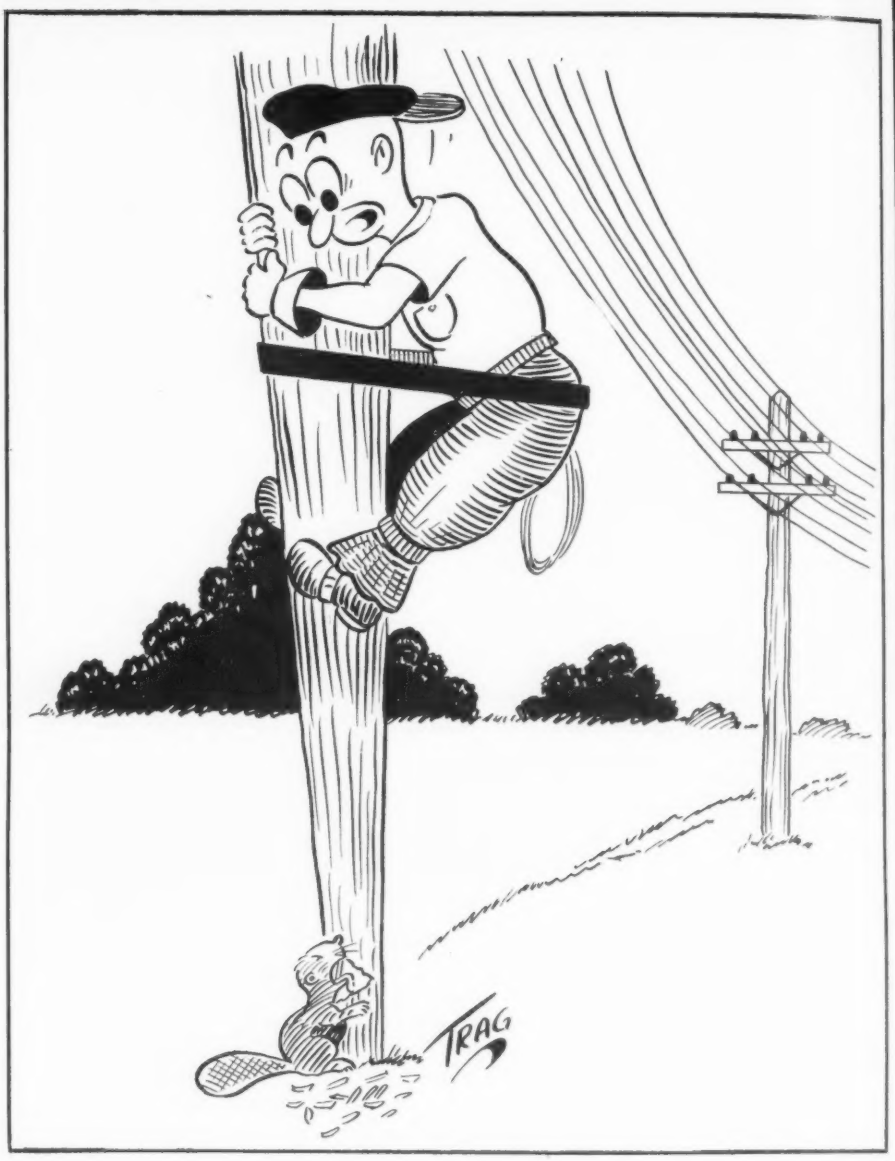
R. L. Mehaffey, manager of the Plant City exchange of the Peninsular Telephone Co., Tampa, Fla., recently received a diamond-studded pin in recognition of his 45 years of service from Carl D. Brorein, president and general manager.

Mr. Mehaffey, who has been with the company longer than any other employe, began in Bartow in 1904 as a night operator. In 1905 he moved to Lakeland, where he acted as night operator and lineman. He joined the Plant City exchange in 1906.

V V

Accepts New Position

A. W. Lambert, former assistant general manager of the telephone division of the California Water & Telephone Co. and vice president of the West Coast Telephone Co. of California, resigned on July 1 to accept a position with the Los Gatos (Calif.) Telephone Co.



Henderson Joins Texas Company As Plant Superintendent

Fox Henderson has been appointed plant superintendent for the Texas Telephone Co., Sherman, Tex. Mr. Henderson succeeds R. M. Wopat who recently joined the Pennsylvania Telephone Corp., Erie, Pa.

Mr. Henderson was formerly general manager of the Mississippi Valley Telephone Co., Carthage, Ill.

V V

Canadian Stockbrokers Dial A Number for N. Y. Quotations

Canadian stockbrokers now have private lines connecting them with the New York stock exchange so that by dialing a number they can receive up-to-the-minute information about two of the listed stocks.

This is made possible by magnetic tape recorders installed by the New York Telephone Co., on an experimental basis. The current "bid" and "asked" stock prices are recorded on the tape directly from the trading posts on the exchange floor. A broker wishing quotations on either of the stocks (U. S. Steel and Standard Gas & Electric preferred) dials a three-digit code number, the dial connection is switched, and a recorded voice announces the quotation.

The new arrangement enables ten subscribers to hear the same quotation simultaneously. It also speeds service and helps reduce error.

V V

Davis Named Commercial Head of Texas Company

Charles N. Davis has been made general commercial superintendent of the Southwestern States Telephone Co., Brownwood, Tex.

Before joining the Southwestern States Telephone Co. as directory supervisor in 1947, Mr. Davis was associated with the Southeast Missouri Telephone Co., Cape Girardeau, Mo.

If your toll call revenues depend on PENCIL work!

CALCULAGRAPH

is one sure way to collect all the revenue due with accurate, automatically calculated, printed toll time records

Calculagraph printed elapsed time records are accurate to the second. These precise printed records assure collection of all the revenue due every toll call. Automatically computed, they relieve switchboard personnel of time-consuming detail work that slows switchboard service. Calculagraph is the engineered, revenue-vital equipment that no exchange—large or small—can afford to overlook. Available for switchboard or portable mounting, they are fully described in four illustrated catalogs. Write for yours, now, on company letterhead.

COMPLETELY ACCURATE TO THE SECOND
AUTOMATICALLY COMPUTES ELAPSED TIME
PRINTS THE RECORD FOR PERMANENT FILING
FACILITATES SWITCHBOARD SERVICE
OPERATES SILENTLY

CALCULAGRAPH COMPANY · INC

HARRISON • NEW JERSEY

THE STANDARD FOR ACCURACY SINCE 1892

ABC of the Telephone

(Concluded from page 11)

In actual practice the specific gravity at full charge will decrease in value as the battery ages. Nothing definite has been developed on the amount of the decrease, but such decrease will be relatively small. At the most, the specific gravity decrease will not be over a few points per year. This slight loss is mentioned only to avoid any misunderstanding when comparisons are made of specific gravity readings taken over a period of years.

In the event a decision is made to adjust the specific gravity of individual or group of cells in the storage battery, first make sure that charging will not increase the gravity. To be sure of this point, continue a normal charge until specific gravity shows no rise, and then continue the charge for three hours more. As a word of caution, the manufacturers specify a gravity adjustment should never be made on a cell that does not gas or bubble on charge.

To adjust low specific gravity, have ready a sufficient quantity of sulphuric acid with a specific gravity of between 1.200 and 1.300. The sulphuric acid should be of a quality and purity satisfactory for storage battery usage. Add this acid in place of water until the gravity at the end of an equalizing charge is normal. When the specific gravity has been adjusted to normal, add water when required in place of sulphuric acid. A faster method, but one that entails more work and use of more acid, is to withdraw part of the low gravity electrolyte and replace with new electrolyte. As a precaution, do not allow a cell to stand partly empty for an appreciable length of time. The amount of electrolyte to be withdrawn and replaced will depend upon the gravities of both the old and the new electrolyte. After the cells have been adjusted as needed, the battery should be placed under charge until all the cells have been gassing for an hour. If, after this period, the specific gravity is not normal further adjustment will be required.

The adjustment of high specific gravity involves the reverse of the foregoing procedure. Electrolyte should be removed from the cell and water added until the specific gravity at the end of an equalizing charge is normal.

Undesirable Chemical Reaction Within Storage Cells

Essentially, the storage cell is a chemical power plant. For this reason, certain chemical reactions that occur inside the cells may be of an undesirable variety, while others are not harmful unless the adverse reaction is allowed to continue for a prolonged period of time. These chemical reactions are:

(1) *Sulphation.* When a storage cell is discharging, lead sulphate is being formed. If a storage cell is neglected, such as when it is left completely discharged, operated undercharged, etc., the sulphate condition will fill the pores of the plates, making the active materials hard and dense. As a result, certain areas of the plates are rendered inactive, and the capacity of the cell is reduced proportionately. Usually, when a plate or cell in this condition is said to be sulphated, generally, small sections of sulphate on the plates can be removed by extra charging. Occasionally, the sulphate condition can be avoided by dropping the specific gravity at full charge to approximately 1.170. While the drop from 1.210 may appear excessive, there will be more active plate material available than with badly sulphated plates in electrolyte with a specific gravity of 1.210 or higher.

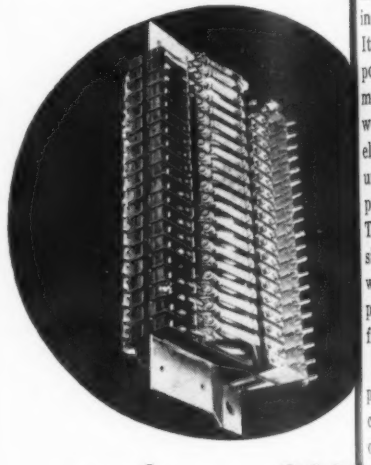
(2) *Mossing.* Mossing is caused by the gathering of a spongy lead material on the faces and top edges of the negative plates. Generally, there are no harmful effects from this condition. If mossing is excessive on the top of the plates, the usual cause is excessive gassing as a result of a constant overcharge.

(3) *Sediment.* As the name implies, sediment is particles of material which may work loose from the plates, and settle to the bottom of the cell jar. Sediment is harmless unless it collects to an extent where the plates are partially short-circuited. Partially short-circuited plates will shunt a portion of the current during charging, and will cause the cell to discharge continuously when not being charged. As a general rule, when the storage battery plant is operated properly, there will be very little sediment deposited in the jar.

(To be continued)

ATTENTION
USITA Convention Goers!

The Traffic Committee of the United States Independent Telephone Association has issued an invitation to members of all Independent telephone companies to send in questions which they would like to have answered at the traffic conference during the forthcoming USITA convention in October. All questions should be sent to E. T. Burgess, Northern Ohio Telephone Co., Bellevue, Ohio.

STRON

cook no. 380
central office protec
Combines cable termination with pr
of central office personnel and eq
against high potentials and sneak c
In operation, it opens the switchboard
grounds the outside line, and ope
alarm circuit. Note these construction
erating features:
1. Provides for temporary disconne
2. Self-soldering, low-resistance he
easily reset after operation w
changing, reversing or re-sold
coils.
3. Line and switchboard connecti
opposite sides of protectors.
4. Steel mounting plate for max
strength.
5. Unit dischargers, consisting c
carbons, separated by acetate d
tric cemented together, perma
grounds the outside line unde
tinuous discharge.
6. Easily tested without removing
coil; withdrawal of test plug i
protector in operating condition.
STROMBER
STROMBERG Telephone CARLSON
TELEPHONES, SWITCHBOARDS •

Labor's Stake in Rate Cases

(Continued from page 13)

cal part about this situation," he said, "is that the public eventually pays the bill for correcting it because statistics have shown conclusively for many years that subnormal wage levels inevitably result in higher unit costs. It's human nature for dissatisfied, poorly paid employes to develop slow motion and take less interest in their work. I could show you figures in the electric construction industry where unit costs were actually higher during periods of subnormal wage levels. These same jobs became less expensive, on an overall basis, following wage increases resulting in better production on the part of the working force.

"Naturally," Boyle continued, "the public stands to benefit from any increase in efficiency and over-all economies which always accompany a satisfied employment force. The important thing to bear in mind is that the consuming public must be brought to realize it has a duty and a responsibility to pay a fair rate for which it can reasonably expect good service. The public is not entitled to a continuation of unreasonably low or confiscatory rates which must clearly exist where telephone companies' earnings are so small as to impair their borrowing credit in their search for capital.

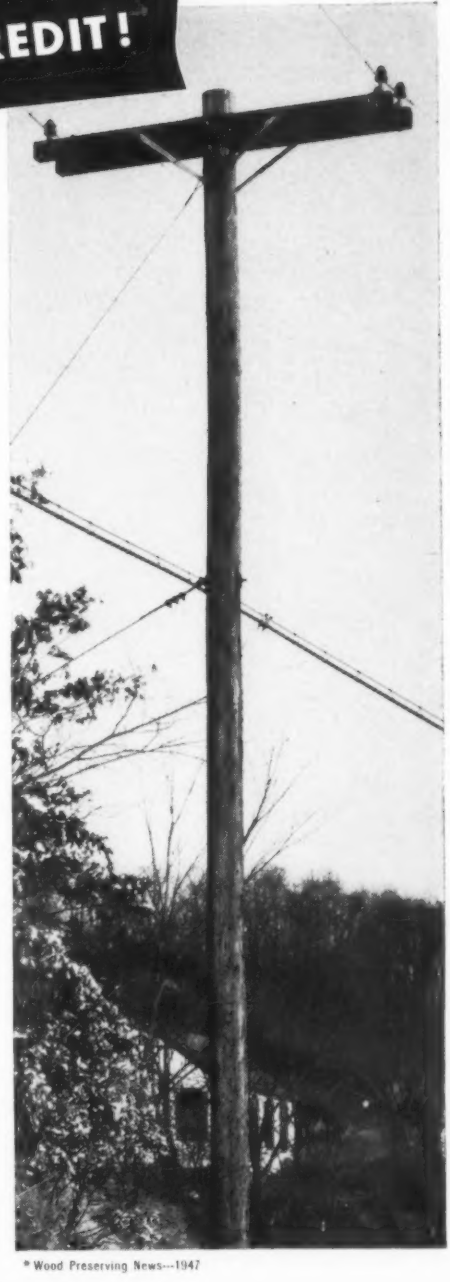
"How," asked Boyle, "can a telephone company improve, or even maintain, its present plant under such inadequate earnings? How can it attract capital necessary to build new buildings and install modern equipment during an era of service expansion? How can it even borrow money from the bank? The plain answer is that it can't. It simply smolders and eventually dies if its earnings are not improved. Naturally our union members don't want to be working for an employer in such a predicament."

This writer next inquired whether these labor unions would be disposed to assist the telephone companies with respect to other operating problems beside rate cases. How would they stand on unfair and discriminatory taxes? How would they stand on the possibility of unfair competition, through the intervention of tax-exempt public agencies, and public ownership generally?

Boyle and Harris were both agreed that a proper position for the intelligent labor union would be to cooperate with any employer faced with such

CASE HISTORY
confirms 30-year service life for treated poles

...AND CREOSOTE GETS THE CREDIT!



HERE'S a convincing case history* concerning 71 pressure-creosoted pine poles—part of an electric power transmission line erected in Kansas in 1917.

In 1947, after 30 years in line, 68 out of 71 poles were still sound and serviceable—furthermore, the inspection revealed that these poles appeared to be capable of service for some time to come. Of the remaining 3 poles, 2 had been removed because of line changes—1 had been damaged by lightning.

Of the original 71 poles, *not a single one had been removed because of decay*—a splendid testimonial to creosote. And all the more noteworthy when you consider that the preservative treatment used to protect these poles was somewhat lighter than is now regarded as good practice.

Creosote is the performance-proved, time-tested preservative for poles and crossarms. And for the best possible creosote delivery service, get in touch with the nation's largest distributor—Koppers. With 14 creosote-producing plants—with 4 large storage plants—Koppers can always meet your creosote requirements.

KOPPERS COMPANY, INC.
Pittsburgh 19, Pa.

* Wood Preserving News—1947

All Standard Specifications
For All Types of Wood Preservation

KOPPERS CREOSOTE... *to be sure!*

problems that threaten its security, or economic existence. Boyle recalled that the experience of his union dealing with tax-exempt public agencies such as electric power districts had been far from satisfactory. Such agencies generally take the position that they cannot bargain on a contractual basis with a union. It was for this reason that the IBEW was compelled to oppose a bill proposed in the South Dakota legislature last spring to authorize the creation of public power districts, and that bill was defeated in the South Dakota Senate.

In all of Boyle's long career, covering more than 50 years in labor union organization, he has been called upon to consent to not more than four or five interruptions in the public utility field. He believes strikes in public utilities can be avoided by the simple device of including proper arbitration provisions in all union-management utility contracts, and by properly exercising these provisions, when necessary, to settle any controversial matters which may otherwise result in termination of the contract and interruption of utility service. Boyle is opposed to the use of court injunctions or other coercive acts to prevent strikes because he thinks such procedures are wasteful, being costly and impractical in their application, and very often serve to make matters worse in contested labor disputes.

"True economic cooperation between management and labor," said Boyle concluding the interview, "is essential to continued progress of our American enterprise system. It is the best safeguard against the encroachment of doctrines which have wrecked and ruined both capital and labor abroad."

V V

British Test Power Line Cross with Telephone Line

British Post Office photographers have recorded by film tests, made in Huntingdonshire in collaboration with the Eastern Electricity Board, to determine the effect of dropping a live power wire, energized at 19,000 volts relative to earth, on to an overhead telephone wire route.

For the tests a special telephone route, isolated from the public network was used and typical exchange apparatus and telephones were fitted in huts at the end of the overhead route, using standard cabling and protectors. The post office camera, running at high speed, photographed the power wire as it fell and made contact with the telephone wires.

The film is projected at normal speed and hence shows in slow motion the flashes and burning through of the telephone wires, during each of three tests, which varied in duration of the power line current from 0.7 to 2.8 seconds. The latter caused all the telephone wires to be brought down. During the tests, cathode ray apparatus recorded power line currents of 800 amperes approximately and voltage of up to 5,000 volts on the telephone wires, until in the third test the apparatus flashed over and caught fire.

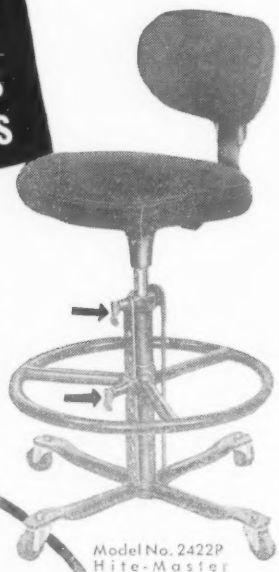
Further results of the tests included bursting of the cables which connected the overhead wires to the telephone apparatus and damage to protectors and fuses, one setting fire to a corner of the hut. A special device simulating a man in the act of dialling on a telephone was found to have received an electric shock great enough to be fatal.

No relaxation will be made in the present guarding between power lines and telephone lines as a result of these tests but further tests are intended in collaboration with the British Electricity Authority.

Meanwhile the BEA is arranging to show the film of the tests at the con-

Cramer
TELEPHONE CHAIRS for SWITCHBOARDS and PBX BOARDS

Cramer Chairs are a "Natural" for switchboard jobs, with Hi-Models and Regular Models providing the best in posture seating for every application. They feature comfort, ease of adjustment, proper posture and outstanding versatility. Mobility provided by ball bearing casters means greater board capacity per operator, with less fatigue.



Model No. 2422P Hite-Master

Hi-Model HITE-MASTER Control

AUTOMATIC ADJUSTMENT

The Hi-Model illustrated is equipped with the new oval shaped drop-front seat, pressure relieving molded foam seat cushion, and the new *Hite-Master Control* for automatic seat and footring adjustment (indicated by arrows).

The Cramer Regular model illustrated is job-fitted to the new low-height switchboards. Boasting of all the fine qualities engineered and built into Cramer Posture Chairs, its usefulness is further enhanced by the unique *Hite-Master Control*, making change of operators a pleasure instead of a pest.

WRITE FOR LITERATURE

Model No. 22 Hite-Master

SPECIAL INSTALLATION

Call on Cramer Engineers to provide posture chairs to suit your particular requirements. Illustrated is a chair with a swivel lock which holds the seat stationary at any desired angle. It rolls on ball-bearing wheels on a special track fastened to the floor. If you have a problem in seating, Cramer will answer it!

DISTRIBUTED THROUGH
OFFICE EQUIPMENT DEALERS
Write for literature and name of nearest dealer.
CRAMER POSTURE CHAIR CO., INC.
1205 Charlotte Kansas City 6, Mo.

ference of the International Union of Producers and Distributors of Electrical Energy in Brussels, where the overseas visitors who witnessed the tests will have an opportunity to see the film. The film is a unique record of collaboration by the post office with the electricity authorities to find a solution to a problem which faces telephone and power authorities throughout the world.

V V

Pennsylvania Companies To Be Merged

Three Pennsylvania telephone companies of the Sordoni Organizations, the Commonwealth, Luzerne and Bradford County Telephone companies, headquarters of which are in Forty-Fort, Pa., will be merged to form one company known as the Commonwealth Telephone Co., it has been announced.

"The merger of the three companies will achieve greater efficiency and more economical operation. It will also further expedite the constant program of rehabilitation of the companies' properties and of the $2,500,000 plant expansion and dial conversion program now well under way on the properties of the three companies," Harold G. Payne, vice president and general manager, said.

V V

Dial Service Popular In Smaller Communities

An indication of the popularity of dial telephone service in the smaller communities is evidenced by the experience of the Farmers Mutual Telephone Co., Jesup, Iowa., which on Aug. 15 converted its 900-station exchange.

H. J. Hopkins, general manager, reports that during the first week after the cut-over 47,839 calls were registered and during the first hour 1,142 calls were made.

The new plant is the first dial system in Buchanan County, in which Jesup is located, and the Farmers Mutual company received widespread publicity, with commendation for its progressive management.

» It has been said that one of the most enthusiastic users of a telephone answering device in New York is a song writer who claims he has lost many brilliant inspirations for melodies in the past. Now, whenever he is struck with a melody out of the blue, he keeps humming it, goes to the telephone and calls his own number. He hums the tune to the answering device.

The man on the pole will tell you—

KLEINS

Since 1857

If you know linemen, you know they want the finest in quality when it comes to equipment. Not only does their job depend on it—many times their lives do.

It is the reputation of nearly a century in designing and manufacturing the finest in linemen's equipment that has won Klein its position of preference with linemen and electricians everywhere.

It is easy to make equipment that looks like Kleins. It takes years of experience plus extensive manufacturing facilities to make equipment that performs like Kleins.

Today you are assured prompt delivery on all Klein products. Be sure your pliers, climber straps, safety belts and other items carry the Klein trade-mark—famous for quality "since 1857."

ASK YOUR SUPPLIER
Foreign Distributor:
International Standard Electric Corp., New York

The Klein Pocket Tool Guide showing the Klein line and containing useful tool information will be mailed on request.

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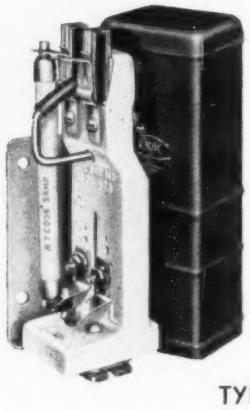
Established 1857 — Chicago, Ill., U.S.A.
3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS

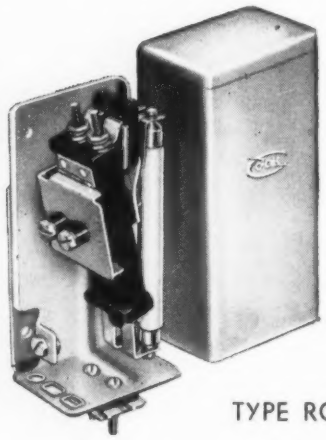
COOK
SUB-STATION PROTECTORS



TYPE O

The Type O single circuit protector, equipped with one pair of fuses and one pair of high potential dischargers are unexcelled for both indoor and outdoor use.

O-7 with A-7 Wood fuses
O-9 with A-9 Lavite fuses
O-12 with A-12 Lavite fuses
O-44 with A-44 Wood fuses

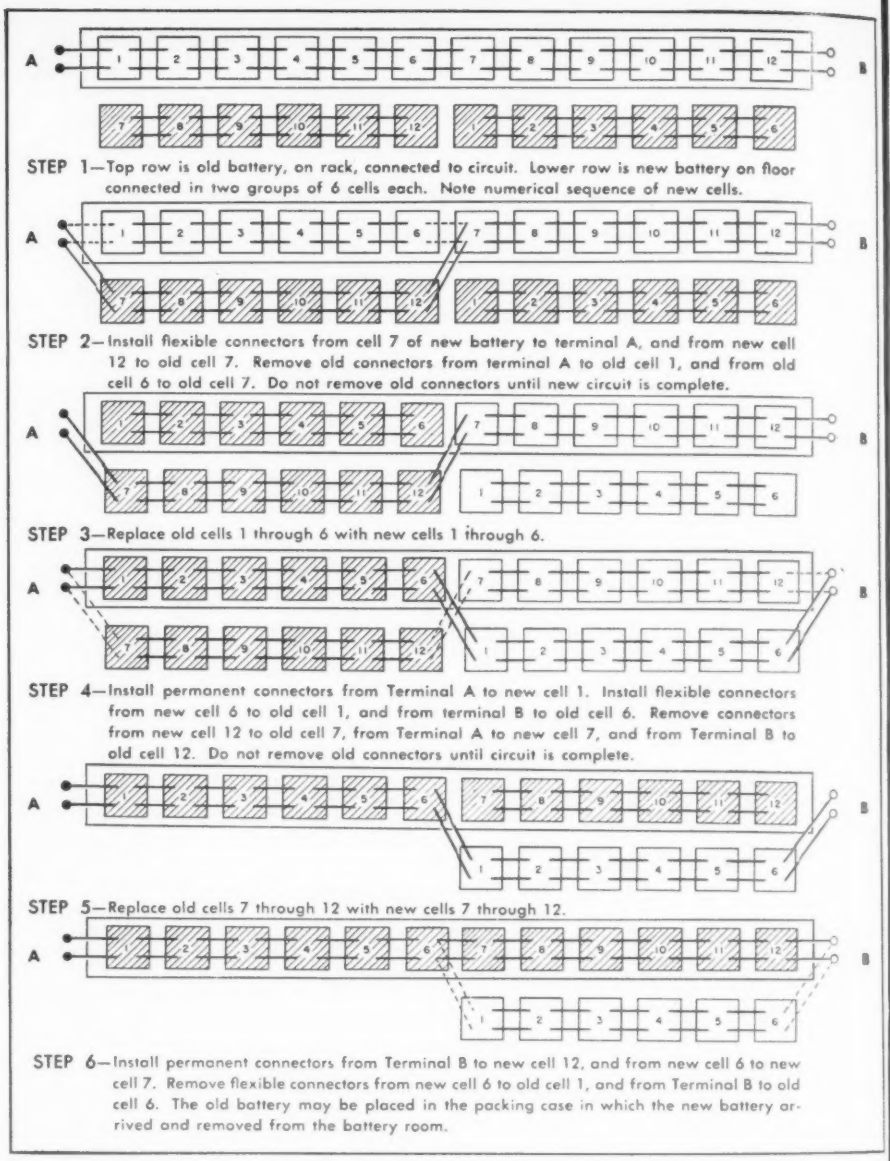


TYPE RO

The Type R Sub-station Protector Mounting is available for two applications: Type RO for outside mounting is equipped with bracket and heavy zinc weather-proof hood and the Type RI (without hood) is for inside mounting. (Type R uses Type H Protector Mounts)

In stock for immediate shipment.

BUCKEYE
TELEPHONE & SUPPLY CO.
COLUMBUS, OHIO


A
B
STEP 1—Top row is old battery, on rack, connected to circuit. Lower row is new battery on floor connected in two groups of 6 cells each. Note numerical sequence of new cells.
STEP 2—Install flexible connectors from cell 7 of new battery to terminal A, and from new cell 12 to old cell 7. Remove old connectors from terminal A to old cell 1, and from old cell 6 to old cell 7. Do not remove old connectors until new circuit is complete.
STEP 3—Replace old cells 1 through 6 with new cells 1 through 6.
STEP 4—Install permanent connectors from Terminal A to new cell 1. Install flexible connectors from new cell 6 to old cell 1, and from terminal B to old cell 6. Remove connectors from new cell 12 to old cell 7, from Terminal A to new cell 7, and from Terminal B to old cell 12. Do not remove old connectors until circuit is complete.
STEP 5—Replace old cells 7 through 12 with new cells 7 through 12.
STEP 6—Install permanent connectors from Terminal B to new cell 12, and from new cell 6 to new cell 7. Remove flexible connectors from new cell 6 to old cell 1, and from Terminal B to old cell 6. The old battery may be placed in the packing case in which the new battery arrived and removed from the battery room.

How to Replace Batteries Without Service Interruption

From time to time it becomes necessary to install new standby storage batteries, and at these times it is often highly desirable to make the change-over without interruption of service. One method of achieving this end is shown in the accompanying diagram, prepared by the Gould Storage Battery Corp.

Step 1 shows two sets of 12 cells, the shaded cells representing the new battery to be installed. In the top row, the old battery is completely connected to the circuit and the new battery is connected in groups of six cells each. This gives an opportunity to inspect the new cells thoroughly before disturbing the old circuit. By tying the new cells together, it can be determined whether the cells are in good order ready for installation. In addition, any shortage of connectors or other parts will be immediately apparent.

In Step 2, flexible leads have been connected to Cell 7 of the new battery from the same terminal as those connected to Cell 1 of the old battery. Connectors to be removed are indicated by dotted lines. Flexible connectors have also been installed between Cell 12 of the new battery and Cell 7 of the old battery. This allows removal of connectors between terminal and Cell 1 and also the connectors between Cells 6 and 7 of the old battery without breaking the circuit. The circuit now becomes Cells 7, 8, 9, 10, 11 and 12 in the new battery, and Cells 7, 8, 9, 10, 11 and 12 in the old battery. Cells 1 to 6 in the old battery can be removed and replaced with Cells 1 to 6 of the new battery.

Cells 1 to 6 of the old battery are placed on the floor and connected in series so that they can be used to maintain a full circuit in Step 4.

Step 4 is similar to Step 2. However, in this case, when Cells 7 to 12 in the old battery are removed from

the circuit, they are placed in the packing case in which the new battery arrived and removed from the battery room. This is indicated in Step 5.

In Step 6 the final connections are made and the old batteries completely removed from the circuit.

The illustration with full instructions is available on an 8½x11 in. sheet suitable for insertion in reference notebooks. Copies may be had by writing the Gould Storage Battery Corp., Trenton 7, N. J. Refer to "Gould Technical Bulletin, GB-1084."

COMING 1949 CONVENTIONS

Tennessee Independent Telephone Association, New Southern Hotel, Jackson, Sept. 16.

Michigan Independent Telephone Association, Olds Hotel, Lansing, Sept. 22 and 23.

Rocky Mountain Telephone Association, Newhouse Hotel, Salt Lake City, Sept. 22 and 23.

United States Independent Telephone Association (annual convention), Stevens Hotel, Chicago, Oct. 10, 11, 12, and 13.

Virginia Independent Telephone Association, Chamberlain Hotel, Old Point Comfort, Oct. 20 and 21.

North Carolina Independent Telephone Association, Carolina Hotel, Pinehurst, Oct. 27 and 28.

South Carolina Independent Telephone Association, Wade Hampton Hotel, Columbia, Nov. 1 and 2.

Florida Telephone Association, Sheraton Plaza Hotel, Daytona Beach, Nov. 8 and 9.

Oklahoma Telephone Association, Huckins Hotel, Oklahoma City, Nov. 8 and 9.

South Dakota Telephone Association, Cataract Hotel, Sioux Falls, Nov. 9 and 10.

Georgia Telephone Association, Henry Grady Hotel, Atlanta, Nov. 14 and 15.

Missouri Telephone Association, Governor Hotel, Jefferson City, Nov. 14 and 15.

Alabama Independent Telephone Association, Jefferson Davis Hotel, Montgomery, Nov. 17 and 18.

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HARDWARE
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TELEPHONE LINE
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Cable Suspension Material • Wire Holders
Pole Seats and Balconies • Clevises • Braces
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Rings • Transposition Brkts. • Eye Bolts
Pole, Corner and House Brkts. • Guy Hooks
Strain Plates • Storm Guy Straps • Lags
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Pulling-in Irons • Expanding Anchors
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"HANG THE LOAD ON HUBBARD HARDWARE"
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HUBBARD AND COMPANY
PITTSBURGH . . . OAKLAND CALIFORNIA . . . CHICAGO
MANUFACTURERS OF A COMPLETE LINE OF HARDWARE
FOR TELEPHONE REQUIREMENTS SINCE 1900

Craig Elected Director Of AT&T Company

Cleo F. Craig was elected a director of the American Telephone & Telegraph Co. on Aug. 17 at a meeting of the board of directors of the company. He is a vice president of the company in charge of operations, engineering and revenue requirements.

All of his business career has been with the company, which he joined 36 years ago as an equipment man at St. Louis. Prior to his appointment to head operations, engineering and revenue requirements a year ago, he had served as vice president in charge of personnel relations for seven years and as general manager and vice president in charge of the Long Lines Department.

V V

Johns-Manville Has Plastic Spacer for Conduit

A new plastic spacer has been developed for use with Transite Korduct, asbestos-cement conduit made by Johns-Manville for electrical systems which must be placed within masonry construction or a concrete envelope. This spacer, which weighs only a few ounces, is now available from Johns-Manville, 22 East 40th Street, New York 16, N. Y.

Left to right: L. C. HANSEN, O. G. ANDERSON, and L. R. CRANE, recently appointed by the A. B. Chance Co., Centralia, Mo., to be managers of sales in the fields of anchors and pole line specialties, hot line tools and conductors, and switchgear and protective devices, respectively.

TEXAS BEST Pressure-Creosoted Poles are your answer to lower maintenance costs. Cut from live, tough East Texas pine, Texas Best Poles are machine-peeled and machine-framed, then pressure-creosoted in our modern plant.

We control production, machining, and pressure treatment of every pole we sell. Send us your schedule the next time you need poles. Remember—production control means cost control to you.

Pressure Creosoted Southern Pine Poles, Posts and Lumber

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Longview, Texas
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TEXAS ★ BEST

WHY "Baby" SOLDERING IRONS WITH FREQUENT SERVICING?

● Those costly hours spent in dressing and reheating irons in your continuous soldering operations can be *eliminated* by using the new, improved G-E CALROD* SOLDERING IRONS.

With long-lasting, ironclad-copper tips—with a sturdy, durable construction for industrial use, these fast-heating G-E soldering irons will operate with uniform efficiency over much longer periods of constant use. Calorized threads prevent the tip from "freezing in", making its replacement both easy and fast. Simplified, complete disassembly features enable you to maintain these irons right in your own shop.

For complete information, ask your G-E Apparatus Distributor for free bulletin GEA-4519. *General Electric Co., Schenectady 5, N. Y.*

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